TRENDS IN ANIMAL AND PLANT SCIENCES
https://doi.org/10.62324/TAPS/2026.010
www.trendsaps.com; editor@trendsaps.com
E-ISSN: 3006-0559; P-ISSN: 3006-0540

RESEARCH ARTICLE

Constraints Faced by Livestock Farmers in Adopting Improved Management Practices in District Vehari, Punjab, Pakistan

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Article History: 26-031 Received: 03 Jan 2026 Revised: 23 Feb 2026 Accepted: 26 Feb 2026

ABSTRACT

Livestock farming is a critical component of the agrarian economy of District Vehari, Punjab, serving as a vital source of income, food security, and livelihood for rural households. However, the sector's productivity remains significantly below its potential due to the low adoption of improved management practices. This study investigated the constraints hindering the adoption of improved livestock management practices among farmers in District Vehari, Punjab, Pakistan. Data were collected from 300 randomly selected livestock farmers through a structured questionnaire. Descriptive statistics and Pearson correlation analysis were applied using SPSS 26. Results revealed that awareness levels were relatively high for vaccination and disease prevention (90%), balanced feeding (84%), and breed improvement (70%). However, adoption rates were considerably lower, at 66%, 62%, and 42%, respectively, with record-keeping showing the lowest adoption (24%). The major constraints identified were economic, institutional, technical, and socio-cultural. Among these, high input costs (Mean=4.48, SD=0.74) and inadequate veterinary services (Mean=4.26, SD=0.82) ranked as the most severe barriers. Correlation analysis revealed that education (r=0.487) and income (r=0.462) were strongly and positively associated with adoption, whereas age showed a negative association (r=-0.216). The study concludes that improving access to credit, veterinary services, and farmer education programs is essential for increasing adoption and enhancing livestock productivity in the region.

Keywords: Livestock management, Adoption, Constraints, Awareness, Socio-economic factors, District Vehari, Punjab, Pakistan.

INTRODUCTION

The livestock sector plays a vital role in the national economy and food security, and employs a large population. The Government of Pakistan (2024) shows that the livestock sector accounts for approximately 62 percent of value added in agriculture and roughly 14 percent of the country's GDP. It also employs more than 8 million rural households and is a major source of income, nutrition, and socio-economic stability, particularly to smallholder farmers. Livestock production is fundamentally intertwined with crop production, which is vital for reducing poverty and attaining sustainable development in the rural regions of Punjab, the largest province by livestock population and production (GOP, 2024; Akram, 2018). According to the Government of Pakistan (2024), livestock is the primary source of income for smallholder farmers, helping them support their households by integrating crop and livestock production systems.

Despite its significance, livestock performance in Pakistan is below its potential due to poor adoption of better management techniques. Better management practices include sustainable feeding, housing, disease prevention and control, breed improvement, record keeping, and marketing approaches (Bhanwala, 2018; Ghafoor, 2021). These are all very critical for promoting animal health, increasing milk and meat production, reducing production costs, and making production sustainable over time. However, the adoption of sustainable practices by smallholder livestock farmers remains limited due to several socio-economic and institutional factors (Gillani et al., 2017).

Earlier studies have found that the primary barriers to the adoption of improved livestock management

Cite This Article as: Ali A, 2026. Constraints faced by livestock farmers in adopting ımproved management practices in district vehari, Punjab, Pakistan. Trends in Animal and Plant Sciences 7: 92-98. https://doi.org/10.62324/TAPS/2026.010

practices include a lack of awareness, inadequate extension services, high input prices, traditional attitudes towards farming, gender disparities, market accessibility problems, and inaccessibility to credit and veterinary services (Eqbal et al., 2013; Gopi et al., 2020). Furthermore, structural barriers in the livestock industry are higher, affecting adoption. These barriers include poor infrastructure, weak farmer organizations, and fragmented value chains. District Vehari, located in southern Punjab, has a mixed crop-livestock-based farming system and is popular for milk and meat production. However, livestock farmers are facing numerous restrictions that hinder optimal production. Livestock farmers are resource-poor, illiterate, and stuck in traditional methods of husbandry.

Although the literature on the causes of low adoption of innovative practices in livestock management is available, studies are limited, with a special focus on farmers' needs and challenges in South Punjab, specifically in the district of Vihari. This paper sought to identify the constraints to the adoption of best livestock management practices in District Vehari. The study provided evidence of socio-economic, institutional, and infrastructural barriers that affect adoption. The specific objectives of the study are: (i) to explore the socio-economic profile of livestock farmers of the District Vehari, (ii) to find out the knowledge and adoption level of farmers on improved livestock management practices, (iii) to identify the barriers in the adoption of improved management practices and (iv) to find out the relationship in the socio-economic variables and adoption. The study findings provided evidence-based guidelines for policymakers, extension agents, and development practitioners on devising appropriate policies, formulating interventions, and implementing projects to overcome barriers and boost the rate of adoption, thereby improving farm productivity.

MATERIALS AND METHODS

The study used a quantitative, descriptive and cross-sectional research design. The study was conducted in District Vehari, comprising three tehsils: Vehari, Burewala, and Mailsi. It is a mixed crop area with dominant livestock, playing a significant role in family income and food security. According to the GoP (2024), the district is highly endowed with cattle, buffaloes, sheep, and goats, which has made it a suitable place to conduct a study on livestock management practices.

All livestock farmers in Vehari District formed the study population. The multistage random sampling technique was used to select an appropriate sample. To achieve geographic diversity, all three tehsils were included in the study. Next, two union councils were selected at random from each tehsil. In the third step, two villages were randomly selected per union council, resulting in 12 villages. Finally, in the fourth step, 24 respondents were randomly selected from each village, resulting in a sample of 300. Primary data were collected using a structured, standardized questionnaire prepared based on the study scope and available literature. The questionnaire was divided into 3 large sections. Part one focused on socio-economic aspects of the farmer, such as age, level of education, herd size, farm size, farming experience, and household income and source. The second was the level of awareness and adoption of improved livestock management practices that integrated balanced feeding, disease prevention and vaccination, breed improvement, better housing and sanitation, and record-keeping. Both the conscious and adoption were binary (Yes=1, No=0) for each practice. The third section was an exploration of constraints that hinder the implementation of improved practices, measured on a five-point Likert scale, where 1 indicates no constraint and 5 indicates a severe constraint. These constraints were grouped into four categories: economic (e.g., high input costs, no credit), technical (e.g., limited knowledge, limited access to technology), institutional (e.g., poor veterinary services, ineffective extension programs), and socio-cultural (e.g., traditional beliefs, gender barriers).

To assess the questionnaire's validity, reliability, and clarity, 20 farmers outside the sampled area pre-tested it. Feedback was used to make changes before the final data collection. Data were collected by trained enumerators in the local language to minimize answer errors and gather precise information, as some respondents are not well-read. Over a period of six weeks, the data collection was carried out. The collected data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Means, percentages, frequencies and standard deviation were computed to describe socio-economic characteristics and awareness and adoption levels. The following weighted mean score formula calculated the severity of constraints.:

$$\bar{X} = \frac{\sum (f \times w)}{N}$$

Where:
$\bar{X}$ =weighted mean score,
f=frequency of responses,
w=weight assigned to each response (1 to 5),
N=total number of respondents.

Constraints were then ranked from highest to lowest based on their mean scores. Inferential statistics were applied to examine relationships among variables. Pearson correlation analysis was employed to determine the strength and direction of relationships between continuous variables, such as income level and adoption rates, following the formula:

$$r=\frac{\sum(X-\bar{X})(Y-\bar{Y})}{\sqrt{(X-\bar{X})^2(Y-\bar{Y})^2}}$$

Where:

r=correlation coefficient,
X=independent variable,
Y=dependent variable,
$\bar{X}$ and $\bar{Y}$=mean values of variables X and Y

Ethical considerations were strictly observed throughout the research process. Farmers were informed about the objectives and significance of the study, and verbal informed consent was obtained prior to participation. Respondents were assured of confidentiality and anonymity**,** and participation was strictly voluntary.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Livestock Farmers

Table 1 presents the socio-economic characteristics of respondents. These results show that middle-aged farmers constitute the largest group among the respondents (60%). The highest percentage of respondents (32%) is in the 41-50 years age bracket, followed by 28% in the 31-40 years age bracket and 24% in the age bracket above 50 years. Most livestock farmers were in their economically productive ages. This is in line with the findings of Gopi et al. (2020) and Jain et al. (2023), who observed that middle-aged farmers are more likely to be involved in agricultural activities and have the physical ability to engage in labor-intensive livestock farming than older farmers. In comparison, younger farmers are ready to embrace new practices.

Regarding education, 34 percent of the respondents were illiterate, and 28 percent had primary education (grade 5). Only 6% of farmers had attained more than intermediate education. These results demonstrate low education level of farmers in the countryside that can be challenging to gain access to information and knowledge regarding innovative ways of managing livestock. Previous studies have pointed out that education plays a significant role in shaping attitudes towards the adoption of innovations. Jain et al. (2023) and Birthal and Negi (2012) posit that educated farmers are more inclined to use scientific knowledge to boost production (through optimal feeding, vaccination, and breed improvement) because they have greater access to knowledge and extension services.

Regarding herd size, 44 percent of farmers had medium-sized herds (6-10 animals), 40 percent had small-sized herds (1-5 animals), and 16 percent had large-sized herds (more than 10 animals). This distribution confirms that smallholders constitute the largest proportion of livestock farmers in District Vehari, as Khan (2019) also concluded that, in Punjab, livestock production was dominated by small-scale farmers with small numbers of animals. Small herd size

Table 1: Socio-Economic Characteristics of Livestock Farmers in District Vehari (n=300)

Variable	Category	Frequency (f)	Percentage (%)
Age (years)	20 – 30	48	16.0
	31 – 40	84	28.0
	41 – 50	96	32.0
	Above 50	72	24.0
	Mean ± SD	42.7 ± 10.6	
Education Level	Illiterate	102	34.0
	Primary (1–5 years)	84	28.0
	Middle (6–8 years)	54	18.0
	Matric (9–10 years)	42	14.0
	Intermediate and above	18	6.0
Herd Size (number of animals)	Small (1 – 5 animals)	120	40.0
	Medium (6 – 10 animals)	132	44.0
	Large (Above 10 animals)	48	16.0
	Mean ± SD	7.8 ± 3.4	
Farm Size (acres)	Less than 5 acres	114	38.0
	5 – 10 acres	102	34.0
	More than 10 acres	84	28.0
	Mean ± SD	7.2 ± 3.1	
Farming Experience (years)	Less than 5 years	42	14.0
	5 – 10 years	78	26.0
	11 – 20 years	108	36.0
	Above 20 years	72	24.0
	Mean ± SD	15.4 ± 7.9	
Household Monthly Income (PKR)	Less than 30,000	96	32.0
	30,001 – 50,000	126	42.0
	50,001 – 70,000	54	18.0
	Above 70,000	24	8.0
	Mean ± SD	46,500 ± 18,200	
Primary Source of Income	Crop Farming	108	36.0
	Livestock Farming	96	32.0
	Off-farm Employment	66	22.0
	Others (e.g., business, labor)	30	10.0

typically reflect inadequate available financial and land resources, which can affect the ability to invest in improved residential, feeding and medical services.

Regarding the size of the farm, 38 percent of respondents owned less than 5 acres, and 34 percent owned 5 to 10 acres. The average size of 7.2 ± 3.1 acres indicated that most respondents were small- to medium-sized farmers. Results of the farming experience indicate that 36 percent of respondents had 11-20 years of farming experience, 26 percent had 5-10 years, and 24 percent had more than 20 years. The mean farming years were 15.4 (SD=7.9), highlighting that respondents were quite experienced. Older farmers generally possess a reservoir of native knowledge which may prove valuable in livestock production, but are also less unlikely to change their practices because of their affinity with the traditional methods (Kitey, 2021) and Khan, 2021).

Regarding household monthly income, 42 percent of respondents reported earnings of PKR 30,001-50,000, while 32 percent reported earnings of less than PKR 30,000. Only 26% of respondents had an income above 50,000 per month. This highlights the dominance of low per-month income among respondents. Low income can be a tremendous barrier to adoption, as modern livestock farming activities such as purchasing quality feeds, vaccinations, and superior breeds are expensive. This is similar to the findings of other scholars, such as Gopi et al. (2020), who observed that one of the main reasons small-scale livestock farmers cannot afford to adopt better farming practices in Pakistan is their economic situation.

Regarding primary sources of income, 36% of the farmers reported crop farming and 32% reported livestock farming. Off-farm jobs accounted for 22 percent, and others, such as business or labor, accounted for 10 percent. It is a sign of diversified rural livelihoods because households rely on various sources of revenue to reduce the risk posed by agriculture, as noted by Jain et al. (2023).

Table 2: Awareness and Adoption of Improved Livestock Management Practices among Farmers (n=300)

Improved Practice	Awareness (%)	Adoption (%)
Balanced Feeding	84.0	62.0
Vaccination and Disease Prevention	90.0	66.0
Breed Improvement Techniques	70.0	42.0
Improved Housing and Sanitation	74.0	50.0
Record-Keeping	46.0	24.0
Overall Mean (%)	72.8	48.8

Awareness and Adoption of Improved Livestock Management Practices

Table 2 presents the levels of awareness and adoption of five key improved livestock management practices among respondents. The findings show a consistent pattern where awareness levels are relatively high, but actual adoption remains significantly lower across all practices. This highlights a knowledge–practice gap, which is a common challenge in rural livestock production systems.

According to the results, 90 percent of farmers reported familiarity with vaccination schedules and disease control procedures. However, the actual adoption was only 66 percent, indicating that, even though farmers attach importance to vaccination, it is hampered by other factors, such as the cost of vaccines, the lack of veterinary services, and the availability of good vaccines. The same results were reported by Jain et al. (2021), who identified inadequate veterinary infrastructure as one of the biggest barriers to livestock health management in Pakistan. The second most well-known practice was balanced feeding, with 84 percent of farmers knowing the need to feed their animals nutritionally balanced diets. However, only 62% were actually implementing this practice. The issues of high feed costs, limited fodder supply in a season, and limited availability of quality feed ingredients are linked to the awareness-to-adoption gap in this case. These results are consistent with those of Gopi et al. (2020), who found that the most significant constraint to sustainable livestock production in Punjab is the cost of feed. Further, 74 percent of respondents recognized the need to provide livestock with well-ventilated, clean housing, yet implementation was low (Figure 1). According to Magsi et al. (2019), the issue of poor housing among the smallholder farmers has remained unresolved due to the inability to invest.

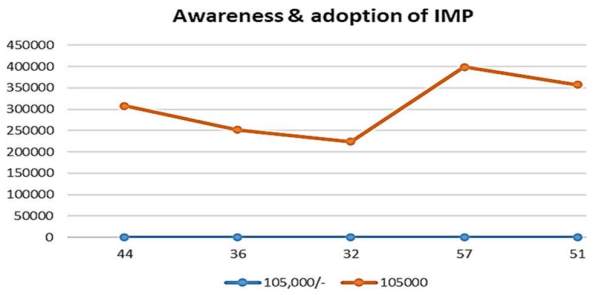

Figure 1: Awareness and adoption of IMP among respondents.

As for breed improvement techniques, such as artificial insemination and selective breeding, 70 percent of farmers had heard of these techniques, and 42 percent were using them. According to Malik et al. (2017), the lack of quality semen, the lack of access to trained technicians, and the use of traditional breeding techniques are persistent barriers.

Record-keeping was the least familiar and adopted practice, with only 46 percent of farmers familiar with its benefits and 24 percent having adopted it. This means that farmers are not trained or literate enough to systematically record their farm activities, such as production, breeding, and health-related data. Contrary results were disclosed by Nadeem et al. (2021), who emphasized that record-keeping is not a problem in most cases because it is a significant component of modern farm management. Overall, the average

awareness of all practices was 72.8 and the average adoption was 48.8.

Constraints Hindering Adoption of Improved Livestock Management Practices

Table 3 summarizes the major constraints that livestock farmers face in practicing the improved livestock management practices. In the economic category, high cost of livestock inputs in terms of feed, vaccines, and breeding services had the highest overall mean score of 4.48 (SD=0.74). This means that high prices play the most significant role in discouraging farmers from investing in innovative management techniques. Inaccessibility of credit was also rated high (Mean=4.34, SD=0.81), indicating that a substantial proportion of smallholders lack access to financial assistance. Other economic limitations included low and variable market prices for livestock products (Mean=4.10) and limited financial capacity to invest in infrastructure (Mean=4.22). These findings are consistent with those of the study by Pata et al. (2018), which noted that the most common issues livestock farmers in rural Punjab encounter include economic factors, namely, increases in input costs and a lack of access to credit.

In the institutional category, inadequate veterinary services attained the highest score (mean=4.26 (SD=0.82). Further, weak extension and advisory services were also rated high with a mean score of 4.12 (SD=0.87). Other institutional issues include a lack of training opportunities for farmers (Mean=3.84) and poor government support policies (Mean=3.80). Rasheed (2020) emphasized the need to strengthen institutional mechanisms to improve livestock productivity, such as the use of extension services and veterinary care.

The most critical technical issue was limited access to the new breeding technology and artificial insemination services (Mean=4.18, SD=0.84), suggesting that people have remained stuck to the old way of breeding. The other technical barriers include limited access to veterinary inputs (Mean=3.96) and limited knowledge of balanced feeding methods (Mean=3.88). These findings are consistent with those of Gopi et al. (2020), who found that knowledge gaps and a lack of technical resources are primary barriers to livestock innovation in rural communities. Among socio-cultural constraints, the most highly rated issue was traditional beliefs and resistance to change (Mean=3.76, SD=0.92). Farmers do not want to adopt modern practices due to cultural beliefs and a lack of trust in new technologies. The other major obstacle was gender (Mean=3.72), indicating that women were less likely to participate in decision-making, despite their central role in livestock care. Other socio-cultural reasons included community norms that influenced adoption (Mean=3.68) and farmers' failure to cooperate in taking collective action (Mean=3.64). Nadeem et al. (2021) confirmed these results and reported that traditional attitudes and gender inequality remain prevalent barriers to agricultural innovation in rural Pakistan.

Inferential Statistics

Correlation Analysis

The findings reveal that multiple variables are strongly and positively correlated with adoption, and one variable is also negatively correlated.

Table 3: Constraints Hindering Adoption of Improved Livestock Management Practices (n=300)

Category	Constraint	Mean	SD
Economic Constraints	High cost of livestock inputs (feed, vaccines, breeding services)	4.48	0.74
	Lack of access to credit/financial services	4.34	0.81
	Low and unstable market prices for livestock products	4.10	0.86
	Limited financial capacity for farm investment	4.22	0.79
Technical Constraints	Lack of access to modern breeding technology and AI services	4.18	0.84
	Poor quality/unavailability of veterinary inputs (vaccines, medicines)	3.96	0.88
	Inadequate information on balanced feeding techniques	3.88	0.91
Institutional Constraints	Inadequate veterinary services (shortage of vets, poor infrastructure)	4.26	0.82
	Weak extension and advisory services	4.12	0.87
	Lack of farmer training and capacity-building programs	3.84	0.93
	Ineffective government policies and support programs	3.80	0.95
Socio-Cultural Constraints	Traditional beliefs and resistance to adopting new practices	3.76	0.92
	Gender barriers limiting women's participation	3.72	0.90
	Community norms influencing decision-making	3.68	0.88
	Lack of cooperation among farmers for collective action	3.64	0.96
Overall Mean	—	4.05	—

Table 4: Correlation Analysis Between Continuous Socio-Economic Variables and Adoption of Improved Livestock Management Practices

Variable	Correlation Coefficient (r)	p-Value	Significance Level
Age (years)	-0.216	0.041	*Significant ($p < 0.05$)*
Education Level (years of schooling)	0.487	0.000	Highly Significant ($p < 0.01$)
Herd Size (number of animals)	0.356	0.003	Highly Significant ($p < 0.01$)
Farm Size (acres)	0.132	0.083	Not Significant (NS)
Farming Experience (years)	0.271	0.027	*Significant ($p < 0.05$)*
Household Income (PKR/month)	0.462	0.001	Highly Significant ($p < 0.01$)

According to Table 4, level of education was identified to have the most positive correlation (r=0.487, p=0.000), indicating that the higher the education levels of the farmers, the higher the chances of them adopting better practices. Somtiya et al. (2024) and Ullah (2020) also found the same results. Household income and quality purchasing were also positively correlated (r=0.462, p=0.001), indicating that income-sufficient farmers are more likely to purchase quality inputs and invest in higher-quality housing and disease prevention. The other variable that significantly correlated is herd size (r = 0.356, p = 0.003), i.e., the larger the herd, the greater the likelihood of adopting sustainable practices. Farming experience was moderately and positively correlated with experience with better practices (r=0.271, p=0.027), which might be due to the fact that more experienced farmers have more experience in dealing with livestock. Interestingly, age was negatively and significantly correlated with adoption (r = -0.216, p = 0.041). This means that young farmers are more innovative than their older counterparts. Lastly, farm size did not significantly predict the use of improved livestock practices (r = 0.132, p = 0.083), suggesting that farm size is not the sole factor determining whether a farmer adopts improved livestock practices. Correlation analysis shows clearly that human capital (education), financial capacity (income) and livestock investment (herd size) are the most influential factors in the adoption of improved practices. These results are consistent with previous research by Jain et al. (2023), who observed the same patterns in the rural population.

Conclusions

The finding indicated that awareness of improved practices, such as improved feeding, vaccination, improved breed, and improved housing, was very high, while adoption was very low. This highlights a critical knowledge-practice gap resulting from various socio-economic, technical, institutional, and socio-cultural constraints. Among these, financial barriers were the most concerning, including the high cost of inputs and the lack of accessible credit, which prevented farmers from investing in new livestock production. Institutional issues that hindered further adoption included poor or insufficient veterinary services and the extension systems. The most prominent technical barrier was the unavailability of modern breeding technology. The study also found that socio-economic factors such as education, household income, and herd size were highly correlated with adoption levels, whereas age was negatively correlated. Correlation analysis shows clearly that human capital (education), financial capacity (income) and livestock investment (herd size) are the most influential factors in the adoption of improved practices. There is a need for intervention programs to improve farmers' education and training, and to expand access to financial assistance, thereby enhancing livestock productivity, farmers' livelihoods, and sustainability.

Declarations

Funding: This research article did not receive any financial support from any agency/institution.

Conflicts of Interest: All authors declare that they have no conflicts of interest.

Data Availability: The data collected for this article are included in the article.

Ethics Statement: No prior studies were conducted on live animals/humans; therefore, no ethical approval was required.

Author's Contributions: Asghar Ali Conceptualization, Data Curation, Methodology, Writing Original draft, Data Collection, Formal Data Analysis, Writing, Reviewing, Editing & Data Analysis.

Generative AI Statements: The authors confirm that no generative artificial intelligence–based tools were employed in the conception, writing, editing, or preparation of this manuscript. All intellectual content, interpretations, and conclusions are the sole responsibility of the authors.

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